Brit 4,927/1906

A.D. 1906. FEB. 28. N.º 4927.

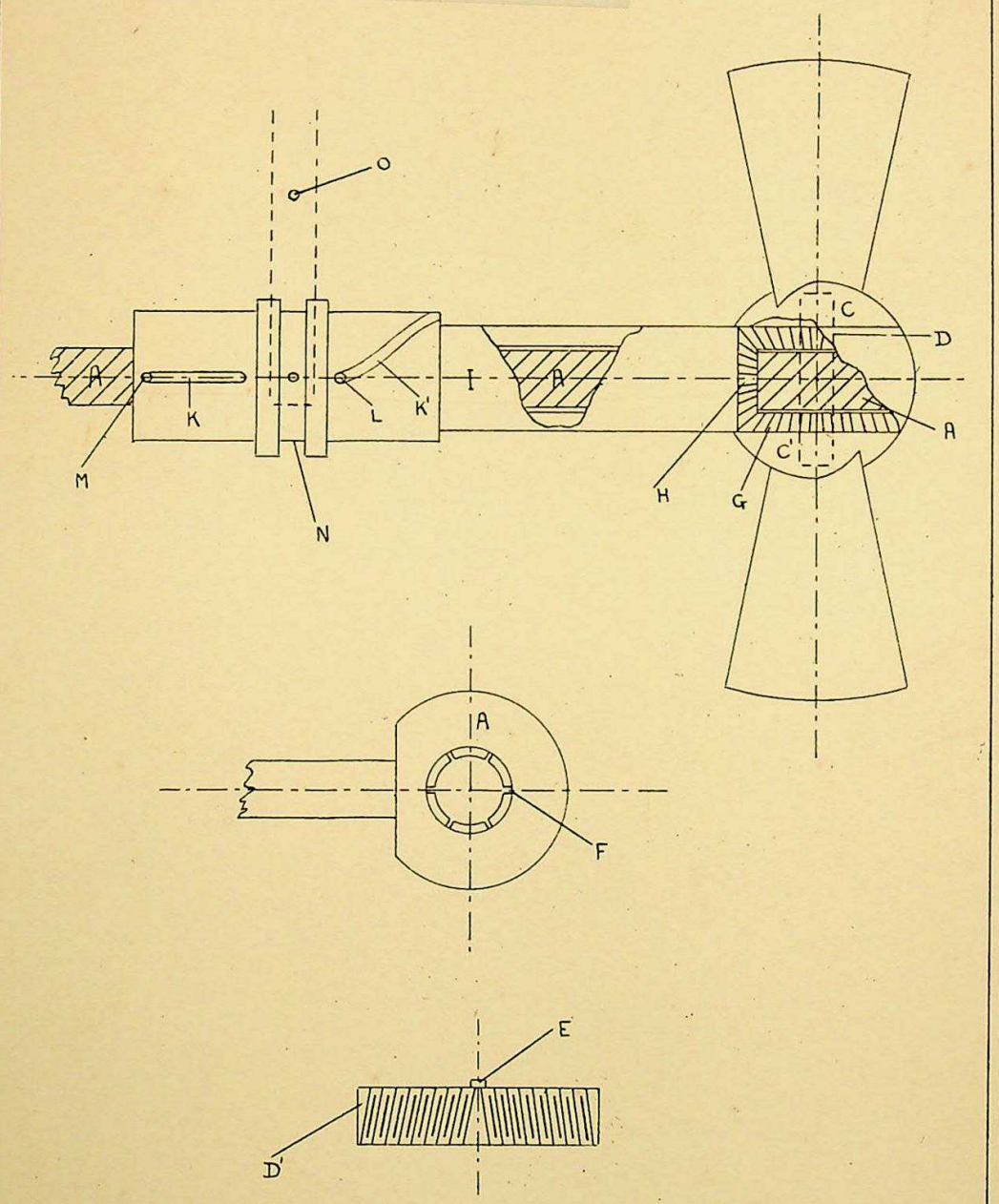
BULLINGHAM'S COMPLETE SPECIFICATION.

(1 SHEET)

Ina-163 Bevel Gear

416/166

~~170-160.45~~



[This Drawing is a reproduction of the Original on a reduced scale.]

Malby&Sons, Photo-Litho.

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N° 4927 A.D. 1906

DUPLICATE

Date of Application, 28th Feb., 1906

Complete Specification Left, 27th Aug., 1906—Accepted, 17th Jan., 1907

PROVISIONAL SPECIFICATION.

A New Reversible Screw Propeller.

HAROLD BIRDSALL BULLINGHAM 8 Park Court Mansions Clapham Park Road Clapham S.W. London. Electrical Engineer do hereby declare the nature of this invention to be as follows :—

This invention consists of a new method of constructing a reversible blade propeller, providing for increased strength where the blades join the boss, an efficient shape of boss, and a means of actuating the blades.

This is obtained by having the boss or centre of the propeller formed in the shape of a complete sphere, from which the blades radiate.

This sphere being in three slices or sections, the centre section being a disc of metal thick enough on its edge to permit of its being secured to the driving shaft at some point on its periphery, the shaft to conform radially to the centre of the disc, the other two sections are the ones carrying the blades, and are flat on one side only, their other or outer sides to which the blades are attached being curved so as to conform to the circumference of the sphere.

These three sections are held together by a pin or stud which is attached to the centre of the flat side of one of the blade sections, then passed through a hole in the centre of the middle disc or driving section and then attached to the centre of the flat side of the other blade section, in such a way as to allow of a turning movement of either blade with its portion of the spherical boss, in either direction, this movement being obtained by a double or concentric shaft and gearing as described hereafter. This spherical construction of the boss permits of each blade having a large base or flange to turn on and take the side thrust, while still keeping the boss fairly small and whatever angle the blades may be set at their bases still conform to the spherical shape, presenting a smooth surface of the boss itself to the water. The method of turning the blades is as follows. Each blade has on the flat side of its section of the boss, a set of teeth arranged near the circumference in the form of a bevel wheel, and these teeth mesh or engage with the teeth of a bevel wheel which is carried on the outer or tubular, of the two concentric shafts. A rotary movement of the blades is produced by turning this outer shaft in either direction relatively to the inner or driving shaft, this relative turning movement being produced by a sliding sleeve which is turned or bored out so as to just pass over the tubular shaft where it enters the boat, the inside of this sleeve is provided with a helical key way, which engages with a key or pin which pin is attached to this tubular or outer shaft, the other end of the sleeve is provided with a key way cut on its inside, but parallel with the shaft and engaging with a key or pin on the main centre or driving shaft so that a longitudinal movement of this sleeve produces a relative rotary movement between the two shafts thus turning the portions of the boss to which the blades are attached and consequently the blades. When driving the boat both shafts of course revolve as a whole.

28th February 1906

HAROLD BIRDSALL BULLINGHAM.

[*Price* 8*d*.]

COMPLETE SPECIFICATION.

A New Reversible Screw Propeller.

HAROLD BIRDSALL BULLINGHAM Electrical Engineer 6 Claro Terrace South Kensington London S.W. "formerly of" 8 Park Court Mansions Clapham Park Road. London S.W. do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention consists of a new method of constructing a reversible blade propeller, providing for increased strength where the blades join the boss and efficient shape of boss.

This is obtained by having the boss or centre of the propeller formed in the shape of a complete sphere from which the blades radiate. For a two bladed propeller this sphere being in three slices or sections, the centre section .A. being a disc or mass of metal thick enough on its edge to permit of its being secured to the driving shaft .B. at some point on its periphery, the shaft to conform radially to the centre of the disc. The other two sections C. C¹. are the ones carrying the blades, and are flat on one side only. Their other or outer sides to which the blades are attached being curved so as to conform to the circumference of the sphere. These three sections are held together by a pin or stud .D. which is attached to the centre of the flat side of one of the blade sections, then passed through or into a hole or slot in the centre of the middle disc or driving section, and then be attached to the centre of the flat side of the other blade section, in such a way as to allow of a turning movement of either blade with its portion of the spherical boss in either direction, this movement being obtained by a double or concentric shaft & gearing, (as described hereafter).

A suggested means of fixing these blades is by means of a screw stud D^1 with a right hand thread cut one end, & a left hand thread the other end, this stud having fixed or projecting from its longitudinal centre a small pin E, this pin to fit in one of several slots or niches F cut in the sides of the hole in the centre member, so as to allow of a sliding movement of the threaded stud through the hole, but not allowing it to turn. The bosses of the blades would of course have right & left hand threaded holes in their centres to permit of their being screwed on to their respective ends of the stud. The teeth on the end of the tubular shaft are then put into mesh with the teeth on the bosses of the blades, so that any turning movement of this shaft will while it turns one blade & unscrews it, will also screw up or tighten the other blade thus keeping same on their shoulders. To insure the blades coming in their right position when screwed home of the centre section, the small pin in the side of the stud can be put in the slot in the side of the hole in centre section which would allow of this without any slackness between the faces, this also provides a means of taking up any slackness due to wear. This spherical construction of the boss permits of each blade having a large base or flange to turn on & take the side thrust, while still keeping the propeller boss fairly small, & whatever angle the blades may be set at their bases still conform to the spherical shape presenting a smooth surface of the boss itself to the water. In case of 3 or more bladed propeller the same construction would of course apply, each blade would carry its section of sphere & the centre member would present an equal number of side for them to work on, this construction still permitting of large shouldering surface & great strength at the root of the blades, without having a large boss to contain mechanism & avoiding the necessity of turning the blades down to a spindle which makes the form of blade inefficient & weak at the root. The method of turning the blades is as follows

Each blade has on the flat side of its section of the boss, a set of teeth .G. arranged near the circumference in the form of either a bevel or spur wheel, & these teeth

mesh or engage with the teeth of a bevel or spur wheel .H. which is carried on the outer or tubular of the two concentric shafts .I. A rotary movement of the blades is produced by turning this outer shaft in either direction relatively to the inner or driving shaft .B. this relative turning movement being produced by a sliding sleeve .J. which is turned or bored out so as to just pass over the tubular shaft .I. where it enters the boat, this sleeve is provided with two key ways .K. .K[1]. one of which is helical & engages with a key or pin .L. which pin is attached to the tubular or outer shaft .I. the other key way .K. is parallel to the axis of the sleeve & engages with a key or pin .M. on the main centre or driving shaft so that a longitudinal movement of this sleeve produces a relative rotary movement between the two shafts, thus turning the portions of the boss to which the blades are attached and consequently the blades.

When driving the boat both shafts of course revolve as a whole, with the helical sleeve, which could be provided with a loose collar .N. which would allow it to revolve, to which collar a lever .O. could be attached to move it along the shaft as desired.

This construction of boss or propeller head, forms, when the teeth on the end of the tubular operating shaft are meshed into the teeth which are cast on the blade sections of the boss, a mechanical whole, from which no portion can possibly vibrate loose & become dismembered while the said teeth are kept in mesh, which may be done by a collar fixed on the centre shaft against the end of the tubular shaft, inside the boat.

I am aware that it has been proposed to construct screw propellers with approximately spherical bosses, and I do not claim any such construction *per. se.*

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is.—

(First) In a reversible screw propeller, constructing the boss, the portion from which the blades radiate, in the form of a sphere which has no projection from its spherical surface save the blades and the shaft, substantially as described & illustrated.

(Second) The employment of a right and left hand screwed stud to secure the parts of the afore mentioned spherical boss, this stud having a small pin or key in its longitudinal centre to fit in one or any of the slots in the side of the hole in the centre section of the spherical boss as before described.

(Third) The employment of a propeller shaft having a disc forged at its end, shaped as before described, to form the centre section of the spherical boss, and drilled to allow the right & left hand above mentioned stud to pass through its centre and slotted to take the key or pin which projects from the side of this same right and left hand stud.

Dated this 25 day of August 1906.

H. B. BULLINGHAM.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1907.